

η

$$I^G(J^{PC}) = 0^+(0^-+)$$

We have omitted some results that have been superseded by later experiments. The omitted results may be found in our 1988 edition Physics Letters **B204** (1988).

NODE=S014

NODE=S014

NODE=S014M

NODE=S014M

NODE=S014M

NEW

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
547.862±0.018 OUR AVERAGE				
[547.853 ± 0.024 MeV OUR 2012 AVERAGE]				
547.873±0.005±0.027	1M	GOSLAWSKI	12	SPEC $d p \rightarrow {}^3\text{He} \eta$
547.874±0.007±0.029		AMBROSINO	07B	KLOE $e^+ e^- \rightarrow \phi \rightarrow \eta \gamma$
547.785±0.017±0.057	16k	MILLER	07	CLEO $\psi(2S) \rightarrow J/\psi \eta$
547.843±0.030±0.041	1134	LAI	02	NA48 $\eta \rightarrow 3\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
547.311±0.028±0.032		¹ ABDEL-BARY	05	SPEC $d p \rightarrow {}^3\text{He} \eta$
547.12 ± 0.06 ± 0.25		KRUSCHE	95D	SPEC $\gamma p \rightarrow \eta p$, threshold
547.30 ± 0.15		PLOUIN	92	SPEC $d p \rightarrow {}^3\text{He} \eta$
547.45 ± 0.25		DUANE	74	SPEC $\pi^- p \rightarrow n$ neutrals
548.2 ± 0.65		FOSTER	65C	HBC
549.0 ± 0.7	148	FOELSCHE	64	HBC
548.0 ± 1.0	91	ALFF-...	62	HBC
549.0 ± 1.2	53	BASTIEN	62	HBC

¹ ABDEL-BARY 05 disagrees significantly with recent measurements of similar or better precision. See comment in the header.

NODE=S014M;LINKAGE=AB

η WIDTH

This is the partial decay rate $\Gamma(\eta \rightarrow \gamma\gamma)$ divided by the fitted branching fraction for that mode. See the note at the start of the $\Gamma(2\gamma)$ data block, next below.

NODE=S014W

NODE=S014W

VALUE (keV)	DOCUMENT ID
1.31±0.05 OUR FIT	
[1.30 ± 0.07 keV OUR 2012 FIT]	

NODE=S014W

NEW

η DECAY MODES

Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Neutral modes		
Γ_1 neutral modes	(72.12±0.34) %	S=1.2
Γ_2 2γ	(39.41±0.20) %	S=1.1
Γ_3 $3\pi^0$	(32.68±0.23) %	S=1.1
Γ_4 $\pi^0 2\gamma$	(2.7 ± 0.5) × 10 ⁻⁴	S=1.1
Γ_5 $2\pi^0 2\gamma$	< 1.2 × 10 ⁻³	CL=90%
Γ_6 4γ	< 2.8 × 10 ⁻⁴	CL=90%
Γ_7 invisible	< 1.0 × 10 ⁻⁴	CL=90%
Charged modes		
Γ_8 charged modes	(28.10±0.34) %	S=1.2
Γ_9 $\pi^+ \pi^- \pi^0$	(22.92±0.28) %	S=1.2
Γ_{10} $\pi^+ \pi^- \gamma$	(4.22±0.08) %	S=1.1
Γ_{11} $e^+ e^- \gamma$	(6.9 ± 0.4) × 10 ⁻³	S=1.3
Γ_{12} $\mu^+ \mu^- \gamma$	(3.1 ± 0.4) × 10 ⁻⁴	
Γ_{13} $e^+ e^-$	< 5.6 × 10 ⁻⁶	CL=90%
Γ_{14} $\mu^+ \mu^-$	(5.8 ± 0.8) × 10 ⁻⁶	
Γ_{15} $2e^+ 2e^-$	(2.40±0.22) × 10 ⁻⁵	DESIG=25

NODE=S014215;NODE=S014

NODE=S014;CLUMP=N

DESIG=101

DESIG=1

DESIG=2

DESIG=7

DESIG=105

DESIG=108

DESIG=107

NODE=S014;CLUMP=C

DESIG=102;OUR EVAL;→ UNCHECKED ←

DESIG=3

DESIG=4

DESIG=8

DESIG=13

DESIG=16

DESIG=12

DESIG=25

Γ_{16}	$\pi^+ \pi^- e^+ e^- (\gamma)$	$(2.68 \pm 0.11) \times 10^{-4}$	DESIG=6
Γ_{17}	$e^+ e^- \mu^+ \mu^-$	$< 1.6 \times 10^{-4}$	DESIG=109
Γ_{18}	$2\mu^+ 2\mu^-$	$< 3.6 \times 10^{-4}$	DESIG=110
Γ_{19}	$\mu^+ \mu^- \pi^+ \pi^-$	$< 3.6 \times 10^{-4}$	DESIG=111
Γ_{20}	$\pi^+ e^- \bar{\nu}_e + \text{c.c.}$	$< 1.7 \times 10^{-4}$	DESIG=112
Γ_{21}	$\pi^+ \pi^- 2\gamma$	$< 2.1 \times 10^{-3}$	DESIG=11
Γ_{22}	$\pi^+ \pi^- \pi^0 \gamma$	$< 5 \times 10^{-4}$	DESIG=10
Γ_{23}	$\pi^0 \mu^+ \mu^- \gamma$	$< 3 \times 10^{-6}$	DESIG=17

**Charge conjugation (C), Parity (P),
Charge conjugation \times Parity (CP), or
Lepton Family number (LF) violating modes**

Γ_{24}	$\pi^0 \gamma$	C	$< 9 \times 10^{-5}$	CL=90%	DESIG=104
Γ_{25}	$\pi^+ \pi^-$	P, CP	$< 1.3 \times 10^{-5}$	CL=90%	DESIG=15
Γ_{26}	$2\pi^0$	P, CP	$< 3.5 \times 10^{-4}$	CL=90%	DESIG=21
Γ_{27}	$2\pi^0 \gamma$	C	$< 5 \times 10^{-4}$	CL=90%	DESIG=103
Γ_{28}	$3\pi^0 \gamma$	C	$< 6 \times 10^{-5}$	CL=90%	DESIG=106
Γ_{29}	3γ	C	$< 1.6 \times 10^{-5}$	CL=90%	DESIG=18
Γ_{30}	$4\pi^0$	P, CP	$< 6.9 \times 10^{-7}$	CL=90%	DESIG=24
Γ_{31}	$\pi^0 e^+ e^-$	C	[a] $< 4 \times 10^{-5}$	CL=90%	DESIG=5
Γ_{32}	$\pi^0 \mu^+ \mu^-$	C	[a] $< 5 \times 10^{-6}$	CL=90%	DESIG=14
Γ_{33}	$\mu^+ e^- + \mu^- e^+$	LF	$< 6 \times 10^{-6}$	CL=90%	DESIG=20

[a] C parity forbids this to occur as a single-photon process.

LINKAGE=CS

CONSTRAINED FIT INFORMATION

An overall fit to a decay rate and 19 branching ratios uses 49 measurements and one constraint to determine 9 parameters. The overall fit has a $\chi^2 = 43.7$ for 41 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle \delta x_i \delta x_j \rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i / \Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_3	24							
x_4	-1	-1						
x_9	-73	-80	-1					
x_{10}	-56	-60	0	61				
x_{11}	-5	-5	0	-6	-4			
x_{12}	-1	0	0	-1	0	0		
x_{16}	0	0	0	0	0	0	0	
Γ	-14	-3	0	11	8	1	0	0
	x_2	x_3	x_4	x_9	x_{10}	x_{11}	x_{12}	x_{16}

Mode	Rate (keV)	Scale factor
Γ_2 2γ	0.516 ± 0.018	
Γ_3 $3\pi^0$	0.428 ± 0.015	
Γ_4 $\pi^0 2\gamma$	$(3.5 \pm 0.7) \times 10^{-4}$	
Γ_9 $\pi^+ \pi^- \pi^0$	0.300 ± 0.011	
Γ_{10} $\pi^+ \pi^- \gamma$	0.0552 ± 0.0022	
Γ_{11} $e^+ e^- \gamma$	0.0090 ± 0.0006	1.2
Γ_{12} $\mu^+ \mu^- \gamma$	$(4.1 \pm 0.5) \times 10^{-4}$	
Γ_{16} $\pi^+ \pi^- e^+ e^- (\gamma)$	$(3.51 \pm 0.19) \times 10^{-4}$	

η DECAY RATES

$\Gamma(2\gamma)$

Γ_2

See the table immediately above giving the fitted decay rates. Following the advice of NEFKENS 02, we have removed the Primakoff-effect measurement from the average. See also the "Note on the Decay Width $\Gamma(\eta \rightarrow \gamma\gamma)$," in our 1994 edition, Phys. Rev. D50, 1 August 1994, Part I, p. 1451, for a discussion of the various measurements.

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.516±0.018 OUR FIT				
[0.510 ± 0.026 keV OUR 2012 FIT]				
0.516±0.018 OUR AVERAGE				
[0.510 ± 0.026 keV OUR 2012 AVERAGE]				
0.520±0.020±0.013	BABUSCI	13A	KLOE	$e^+e^- \rightarrow e^+e^-\eta$
0.51 ± 0.12 ± 0.05	36	BARU	90	MD1 $e^+e^- \rightarrow e^+e^-\eta$
0.490±0.010±0.048	2287	ROE	90	ASP $e^+e^- \rightarrow e^+e^-\eta$
0.514±0.017±0.035	1295	WILLIAMS	88	CBAL $e^+e^- \rightarrow e^+e^-\eta$
0.53 ± 0.04 ± 0.04		BARTEL	85E	JADE $e^+e^- \rightarrow e^+e^-\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.476±0.062	2	RODRIGUES	08	CNTR Reanalysis
0.64 ± 0.14 ± 0.13		AIHARA	86	TPC $e^+e^- \rightarrow e^+e^-\eta$
0.56 ± 0.16	56	WEINSTEIN	83	CBAL $e^+e^- \rightarrow e^+e^-\eta$
0.324±0.046		BROWMAN	74B	CNTR Primakoff effect
1.00 ± 0.22		3	BEMPORAD	67 CNTR Primakoff effect

² RODRIGUES 08 uses a more sophisticated calculation for the inelastic background due to incoherent photoproduction to reanalyze the η photoproduction data on Be and Cu at 9 GeV from BROWMAN 74B. This brings the value of $\Gamma(\eta \rightarrow 2\gamma)$ in line with direct measurements of the width. The error here is only statistical.

³ BEMPORAD 67 gives $\Gamma(2\gamma) = 1.21 \pm 0.26$ keV assuming $\Gamma(2\gamma)/\Gamma(\text{total}) = 0.314$. Bemporad private communication gives $\Gamma(2\gamma)^2/\Gamma(\text{total}) = 0.380 \pm 0.083$. We evaluate this using $\Gamma(2\gamma)/\Gamma(\text{total}) = 0.38 \pm 0.01$. Not included in average because the uncertainty resulting from the separation of the coulomb and nuclear amplitudes has apparently been underestimated.

NODE=S014220

NODE=S014W1

NODE=S014W1

NODE=S014W1

NEW

NEW

NODE=S014W1;LINKAGE=RO

NODE=S014W1;LINKAGE=B

NODE=S014225

NODE=S014310

NODE=S014R21

NODE=S014R21

NEW

NODE=S014R34
NODE=S014R34

NEW

NODE=S014R34;LINKAGE=LO

NODE=S014R12
NODE=S014R12

NEW

η BRANCHING RATIOS

Neutral modes

$\Gamma(\text{neutral modes})/\Gamma_{\text{total}}$			$\Gamma_1/\Gamma = (\Gamma_2 + \Gamma_3 + \Gamma_4)/\Gamma$	
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.7212±0.0034 OUR FIT	Error includes scale factor of 1.2.	[0.7191 ± 0.0034 OUR 2012 FIT Scale factor = 1.2]		
0.705 ± 0.008	16k	BASILE	71D	CNTR MM spectrometer
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.79 ± 0.08		BUNIATOV	67	OSPK

$\Gamma(2\gamma)/\Gamma_{\text{total}}$			Γ_2/Γ	
VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
39.41±0.20 OUR FIT	Error includes scale factor of 1.1.	$[(39.31 \pm 0.20) \times 10^{-2}$ OUR 2012 FIT Scale factor = 1.1]		
39.49±0.17±0.30	65k	ABEGG	96	SPEC $pd \rightarrow {}^3\text{He}\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
38.45±0.40±0.36	14k	⁴ LOPEZ	07	CLEO $\psi(2S) \rightarrow J/\psi\eta$

⁴ Not independent of other results listed for LOPEZ 07. Assuming decays of $\eta \rightarrow \gamma\gamma$, $3\pi^0$, $\pi^+\pi^-\pi^0$, $\pi^+\pi^-\gamma$, and $e^+e^-\gamma$ account for all η decays within a contribution of 0.3% to the systematic error.

$\Gamma(2\gamma)/\Gamma(\text{neutral modes})$			$\Gamma_2/\Gamma_1 = \Gamma_2/(\Gamma_2 + \Gamma_3 + \Gamma_4)$	
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.5465±0.0019 OUR FIT	[0.5467 ± 0.0019 OUR 2012 FIT]			
0.548 ± 0.023 OUR AVERAGE	Error includes scale factor of 1.5.			
0.535 ± 0.018		BUTTRAM	70	OSPK
0.59 ± 0.033		BUNIATOV	67	OSPK

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.52	± 0.09	88	ABROSIMOV	80	HLBC
0.60	± 0.14	113	KENDALL	74	OSPK
0.57	± 0.09		STRUGALSKI	71	HLBC
0.579	± 0.052		FELDMAN	67	OSPK
0.416	± 0.044		DIGIUGNO	66	CNTR Error doubled
0.44	± 0.07		GRUNHAUS	66	OSPK
0.39	± 0.06	5	JONES	66	CNTR

5 This result from combining cross sections from two different experiments.

$\Gamma(3\pi^0)/\Gamma_{\text{total}}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_3/Γ
32.68 ± 0.23 OUR FIT	Error includes scale factor of 1.1. [$(32.57 \pm 0.23) \times 10^{-2}$ OUR 2012 FIT Scale factor = 1.1]				

• • • We do not use the following data for averages, fits, limits, etc. • • •

34.03 ± 0.56 ± 0.49	1821	6 LOPEZ	07 CLEO	$\psi(2S) \rightarrow J/\psi\eta$
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6 Not independent of other results listed for LOPEZ 07. Assuming decays of $\eta \rightarrow \gamma\gamma$, $3\pi^0$, $\pi^+\pi^-\pi^0$, $\pi^+\pi^-\gamma$, and $e^+e^-\gamma$ account for all η decays within a contribution of 0.3% to the systematic error.

$\Gamma(3\pi^0)/\Gamma(\text{neutral modes})$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_3/\Gamma_1 = \Gamma_3/(\Gamma_2 + \Gamma_3 + \Gamma_4)$
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0.4531 ± 0.0019 OUR FIT

[0.4529 ± 0.0019 OUR 2012 FIT]

0.439 ± 0.024

BUTTRAM 70 OSPK

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.44	± 0.08	75	ABROSIMOV	80	HLBC
0.32	± 0.09		STRUGALSKI	71	HLBC
0.41	± 0.033		BUNIATOV	67	OSPK Not indep. of $\Gamma(2\gamma)/\Gamma(\text{neutral modes})$
0.177	± 0.035		FELDMAN	67	OSPK
0.209	± 0.054		DIGIUGNO	66	CNTR Error doubled
0.29	± 0.10		GRUNHAUS	66	OSPK

$\Gamma(3\pi^0)/\Gamma(2\gamma)$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_3/Γ_2
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0.829 ± 0.006 OUR FIT

0.829 ± 0.007 OUR AVERAGE

0.884 ± 0.022 ± 0.019	1821	LOPEZ	07 CLEO	$\psi(2S) \rightarrow J/\psi\eta$
0.817 ± 0.012 ± 0.032	17.4k	7 AKHMETSHIN	05 CMD2	$e^+e^- \rightarrow \phi \rightarrow \eta\gamma$
0.826 ± 0.024		ACHASOV	00D SND	$e^+e^- \rightarrow \phi \rightarrow \eta\gamma$
0.832 ± 0.005 ± 0.012		KRUSCHE	95D SPEC	$\gamma p \rightarrow \eta p$, threshold
0.841 ± 0.034		AMSLER	93 CBAR	$\bar{p}p \rightarrow \pi^+\pi^-\eta$ at rest
0.822 ± 0.009		ALDE	84 GAM2	

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.796 ± 0.016 ± 0.016		ACHASOV	00 SND	See ACHASOV 00D
0.91	± 0.14	COX	70B HBC	
0.75	± 0.09	DEVONS	70 OSPK	
0.88	± 0.16	BALTAY	67D DBC	
1.1	± 0.2	CENCE	67 OSPK	
1.25	± 0.39	BACCI	63 CNTR	Inverse BR reported

7 Uses result from AKHMETSHIN 01B.

NODE=S014R6
NODE=S014R6

$\Gamma(\pi^0 2\gamma)/\Gamma_{\text{total}}$

Γ_4/Γ

Early results are summarized in the review by LANDSBERG 85.

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
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2.7 ± 0.5 OUR FIT Error includes scale factor of 1.1.

2.21 ± 0.24 ± 0.47 ≈ 500 ⁸ PRAKHOB 08 CRYB $\pi^- p \rightarrow \eta n \approx$ threshold

• • • We do not use the following data for averages, fits, limits, etc. • • •

3.5	± 0.7	± 0.6	1.6k	9,10 PRAKHOB	05 CRYB See PRAKHOB 08
<8.4		90	7	ACHASOV	01D SND $e^+e^- \rightarrow \phi \rightarrow \eta\gamma$
<30		90	0	DAVYDOV	81 GAM2 $\pi^- p \rightarrow \eta n$

8 PRAKHOB 08 is a reanalysis of the data of PRAKHOB 05, using for the first time the invariant-mass spectrum of the two photons.

9 Normalized using $\Gamma(\eta \rightarrow 2\gamma)/\Gamma = 0.3943 \pm 0.0026$.

10 This measurement and the independent analysis of the same data by KNECHT 04 both imply a lower value of $\Gamma(\pi^0 2\gamma)$ than the one obtained by ALDE 84 from $\Gamma(\pi^0 2\gamma)/\Gamma(2\gamma)$.

NODE=S014R22
NODE=S014R22
NODE=S014R22

NODE=S014R22;LINKAGE=PK

NODE=S014R22;LINKAGE=PA
NODE=S014R22;LINKAGE=PR

$\Gamma(\pi^0 2\gamma)/\Gamma(2\gamma)$						Γ_4/Γ_2
VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
0.69±0.13 OUR FIT	Error includes scale factor of 1.1.					
1.8 ±0.4	ALDE	84	GAM2	0		
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2.5 ±0.6	70	BINON	82	GAM2	See ALDE 84	

NODE=S014R43
NODE=S014R43

$\Gamma(\pi^0 2\gamma)/\Gamma(3\pi^0)$						Γ_4/Γ_3
VALUE (units 10^{-4})		DOCUMENT ID	TECN	COMMENT		
8.3±1.6 OUR FIT	Error includes scale factor of 1.1.					
• • • We do not use the following data for averages, fits, limits, etc. • • •						
8.3±2.8±1.4	11	KNECHT	04	CRYB	$\pi^- p \rightarrow n\eta$	
11 Independent analysis of same data as PRAKHOV 05.						

NODE=S014R42
NODE=S014R42

$\Gamma(2\pi^0 2\gamma)/\Gamma_{\text{total}}$						Γ_5/Γ
VALUE	CL%	DOCUMENT ID	TECN	COMMENT		
<1.2 × 10⁻³	90	12 NEFKENS	05A	CRYB	$p(720 \text{ MeV}/c) \pi^- \rightarrow n\eta$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<4.0 × 10 ⁻³	90	BLIK	07	GAM4	$\pi^- p \rightarrow \eta n$	
12 Measurement is done in limited $\gamma\gamma$ energy range.						

NODE=S014R42;LINKAGE=KN
NODE=S014R47
NODE=S014R47

$\Gamma(4\gamma)/\Gamma_{\text{total}}$						Γ_6/Γ
VALUE	CL%	DOCUMENT ID	TECN	COMMENT		
<2.8 × 10⁻⁴	90	BLIK	07	GAM4	$\pi^- p \rightarrow \eta n$	

NODE=S014R47;LINKAGE=NE
NODE=S014R50
NODE=S014R50

$\Gamma(\text{invisible})/\Gamma(2\gamma)$						Γ_7/Γ_2
VALUE	CL%	DOCUMENT ID	TECN	COMMENT		
<2.6 × 10⁻⁴ (CL = 90%)	[<1.65 × 10 ⁻³ (CL = 90%) OUR 2012 BEST LIMIT]					
<2.6 × 10⁻⁴	90	13 ABLIKIM	13	BES3	$J/\psi \rightarrow \phi\eta$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<1.65 × 10 ⁻³	90	14 ABLIKIM	06Q	BES2	$J/\psi \rightarrow \phi\eta$	

NODE=S014R49
NODE=S014R49

13 Based on 225M J/ψ decays.						
14 Based on 58M J/ψ decays.						
———— Charged modes ————						
$\Gamma(\pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}$						Γ_9/Γ
VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT		
22.92±0.28 OUR FIT	Error includes scale factor of 1.2. [(22.74 ± 0.28) × 10 ⁻² OUR 2012 FIT Scale factor = 1.2]					
• • • We do not use the following data for averages, fits, limits, etc. • • •						
22.60±0.35±0.29	3915	15 LOPEZ	07	CLEO	$\psi(2S) \rightarrow J/\psi\eta$	

NODE=S014R49;LINKAGE=A
NODE=S014R49;LINKAGE=AB
NODE=S014315

NODE=S014R53
NODE=S014R53

NEW

NODE=S014R53;LINKAGE=LO

$\Gamma(\text{neutral modes})/\Gamma(\pi^+ \pi^- \pi^0)$						$\Gamma_1/\Gamma_9 = (\Gamma_2 + \Gamma_3 + \Gamma_4)/\Gamma_9$
VALUE	EVTS	DOCUMENT ID	TECN			
3.15±0.05 OUR FIT	Error includes scale factor of 1.2. [3.16 ± 0.05 OUR 2012 FIT Scale factor = 1.2]					
• • • We do not use the following data for averages, fits, limits, etc. • • •						
3.26±0.30 OUR AVERAGE						
2.54±1.89	74	KENDALL	74	OSPK		
3.4 ±1.1	29	AGUILAR-...	72B	HBC		
2.83±0.80	70	16 BLOODWO...	72B	HBC		
3.6 ±0.6	244	FLATTE	67B	HBC		
2.89±0.56		ALFF-...	66	HBC		
3.6 ±0.8	50	KRAEMER	64	DBC		
3.8 ±1.1		PAULI	64	DBC		

NODE=S014R8
NODE=S014R8
NEW

16 Error increased from published value 0.5 by Bloodworth (private communication).

NODE=S014R8;LINKAGE=B

$\Gamma(2\gamma)/\Gamma(\pi^+\pi^-\pi^0)$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_2/Γ_9
1.720 ± 0.028 OUR FIT	Error includes scale factor of 1.2. [1.728 ± 0.028 OUR 2012 FIT Scale factor = 1.2]				NODE=S014R7
1.70 ± 0.04 OUR AVERAGE					
1.704 ± 0.032 ± 0.026	3915	17 LOPEZ	07 CLEO	$\psi(2S) \rightarrow J/\psi\eta$	NODE=S014R7
1.61 ± 0.14		ABLIKIM	06E BES2	$e^+e^- \rightarrow J/\psi \rightarrow \eta\gamma$	NEW
1.78 ± 0.10 ± 0.13	1077	AMSLER	95 CBAR	$\bar{p}p \rightarrow \pi^+\pi^-\eta$ at rest	
1.72 ± 0.25	401	BAGLIN	69 HLBC		
1.61 ± 0.39		FOSTER	65 HBC		

17 LOPEZ 07 reports $\Gamma(\eta \rightarrow \pi^+\pi^-\pi^0) / \Gamma(\eta \rightarrow 2\gamma) = \Gamma_9/\Gamma_2 = 0.587 \pm 0.011 \pm 0.009$.

 $\Gamma(3\pi^0)/\Gamma(\pi^+\pi^-\pi^0)$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_3/Γ_9
1.426 ± 0.026 OUR FIT	Error includes scale factor of 1.2. [1.432 ± 0.026 OUR 2012 FIT Scale factor = 1.2]				NODE=S014R19
1.48 ± 0.05 OUR AVERAGE					

1.46 ± 0.03 ± 0.09		ACHASOV	06A SND	$e^+e^- \rightarrow \eta\gamma$	
1.52 ± 0.04 ± 0.08	23k	AKHMETSHIN	01B CMD2	$e^+e^- \rightarrow \phi \rightarrow \eta\gamma$	
1.44 ± 0.09 ± 0.10	1627	AMSLER	95 CBAR	$\bar{p}p \rightarrow \pi^+\pi^-\eta$ at rest	
1.50 ± 0.15 -0.29	199	BAGLIN	69 HLBC		
1.47 ± 0.20 -0.17		BULLOCK	68 HLBC		

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.3 ± 0.4		BAGLIN	67B HLBC	
0.90 ± 0.24		FOSTER	65 HBC	
2.0 ± 1.0		FOELSCHE	64 HBC	
0.83 ± 0.32		CRAWFORD	63 HBC	

18 AKHMETSHIN 01B uses results from AKHMETSHIN 99F.

 $\Gamma(\pi^+\pi^-\pi^0)/[\Gamma(2\gamma) + \Gamma(3\pi^0)]$

VALUE	DOCUMENT ID	TECN	COMMENT	$\Gamma_9/(\Gamma_2+\Gamma_3)$
0.318 ± 0.005 OUR FIT	Error includes scale factor of 1.2. [0.316 ± 0.005 OUR 2012 FIT Scale factor = 1.2]			

0.304 ± 0.012	ACHASOV	00D SND	$e^+e^- \rightarrow \phi \rightarrow \eta\gamma$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.3141 ± 0.0081 ± 0.0058	ACHASOV	00B SND	See ACHASOV 00D	

 $\Gamma(\pi^+\pi^-\gamma)/\Gamma_{\text{total}}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_{10}/Γ
4.22 ± 0.08 OUR FIT	Error includes scale factor of 1.1. [(4.60 ± 0.16) × 10 $^{-2}$ OUR 2012 FIT Scale factor = 2.0]				NODE=S014R38

• • • We do not use the following data for averages, fits, limits, etc. • • •

3.96 ± 0.14 ± 0.14	859	19 LOPEZ	07 CLEO	$\psi(2S) \rightarrow J/\psi\eta$
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19 Not independent of other results listed for LOPEZ 07. Assuming decays of $\eta \rightarrow \gamma\gamma$, $3\pi^0$, $\pi^+\pi^-\pi^0$, $\pi^+\pi^-\gamma$, and $e^+e^-\gamma$ account for all η decays within a contribution of 0.3% to the systematic error.

 $\Gamma(\pi^+\pi^-\gamma)/\Gamma(\pi^+\pi^-\pi^0)$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_{10}/Γ_9
0.1842 ± 0.0027 OUR FIT	[0.202 ± 0.007 OUR 2012 FIT Scale factor = 2.3]				NODE=S014R4

0.1847 ± 0.0030 OUR AVERAGE	Error includes scale factor of 1.1. [0.203 ± 0.008 OUR 2012 AVERAGE Scale factor = 2.4]				NODE=S014R4
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0.1856 ± 0.0005 ± 0.0028	200k	BABUSCI	13 KLOE	$e^+e^- \rightarrow \phi \rightarrow \eta\gamma$	
0.175 ± 0.007 ± 0.006	859	LOPEZ	07 CLEO	$\psi(2S) \rightarrow J/\psi\eta$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.209 ± 0.004	18k	THALER	73 ASPK	
0.201 ± 0.006	7250	GORMLEY	70 ASPK	
0.28 ± 0.04		BALTAY	67B DBC	
0.25 ± 0.035		LITCHFIELD	67 DBC	
0.30 ± 0.06		CRAWFORD	66 HBC	
0.196 ± 0.041		FOSTER	65C HBC	

$\Gamma(e^+e^-\gamma)/\Gamma_{\text{total}}$					Γ_{11}/Γ
VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT	
6.9 ± 0.4 OUR FIT	Error includes scale factor of 1.3.				
6.7 ± 0.5 OUR AVERAGE	Error includes scale factor of 1.2.				
6.6 ± 0.4 ± 0.4	1345	BERGHAUSER 11	SPEC	$\gamma p \rightarrow p\eta$	
7.8 ± 0.5 ± 0.8	435 ± 31	BERLOWSKI 08	WASA	$pd \rightarrow {}^3\text{He } \eta$	
5.15 ± 0.62 ± 0.74	283	ACHASOV 01B	SND	$e^+e^- \rightarrow \phi \rightarrow \eta\gamma$	
7.10 ± 0.64 ± 0.46	323	AKHMETSHIN 01	CMD2	$e^+e^- \rightarrow \phi \rightarrow \eta\gamma$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
9.4 ± 0.7 ± 0.5	172	LOPEZ 20	07	CLEO $\psi(2S) \rightarrow J/\psi\eta$	

20 Not independent of other results listed for LOPEZ 07. Assuming decays of $\eta \rightarrow \gamma\gamma$, $3\pi^0$, $\pi^+\pi^-\pi^0$, $\pi^+\pi^-\gamma$, and $e^+e^-\gamma$ account for all η decays within a contribution of 0.3% to the systematic error.

$\Gamma(e^+e^-\gamma)/\Gamma(\pi^+\pi^-\gamma)$					Γ_{11}/Γ_{10}
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
0.163 ± 0.011 OUR FIT	Error includes scale factor of 1.2. [0.150 ± 0.011 OUR 2012 FIT Scale factor = 1.3]				
0.237 ± 0.021 ± 0.015	172	LOPEZ	07	CLEO $\psi(2S) \rightarrow J/\psi\eta$	

$\Gamma(e^+e^-\gamma)/\Gamma(\pi^+\pi^-\pi^0)$					Γ_{11}/Γ_9
VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT	
3.00 ± 0.19 OUR FIT	Error includes scale factor of 1.3. [(3.02 ± 0.19) × 10 ⁻² OUR 2012 FIT Scale factor = 1.2]				
2.1 ± 0.5	80	JANE	75B	OSPK See the erratum	

$\Gamma(\text{neutral modes})/[\Gamma(\pi^+\pi^-\pi^0) + \Gamma(\pi^+\pi^-\gamma) + \Gamma(e^+e^-\gamma)]$					$\Gamma_1/(\Gamma_9+\Gamma_{10}+\Gamma_{11})=(\Gamma_2+\Gamma_3+\Gamma_4)/(\Gamma_9+\Gamma_{10}+\Gamma_{11})$
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
2.59 ± 0.04 OUR FIT	Error includes scale factor of 1.2. [2.57 ± 0.04 OUR 2012 FIT Scale factor = 1.2]				

2.64 ± 0.23	BALTAY	67B	DBC		
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.5 ± 1.0	280	21 JAMES	66	HBC	
3.20 ± 1.26	53	21 BASTIEN	62	HBC	
2.5 ± 1.0	10	21 PICKUP	62	HBC	

21 These experiments are not used in the averages as they do not separate clearly $\eta \rightarrow \pi^+\pi^-\pi^0$ and $\eta \rightarrow \pi^+\pi^-\gamma$ from each other. The reported values thus probably contain some unknown fraction of $\eta \rightarrow \pi^+\pi^-\gamma$.

$\Gamma(2\gamma)/[\Gamma(\pi^+\pi^-\pi^0) + \Gamma(\pi^+\pi^-\gamma) + \Gamma(e^+e^-\gamma)]$					$\Gamma_2/(\Gamma_9+\Gamma_{10}+\Gamma_{11})$
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
1.416 ± 0.023 OUR FIT	Error includes scale factor of 1.2. [1.402 ± 0.023 OUR 2012 FIT Scale factor = 1.2]				

1.1 ± 0.4 OUR AVERAGE	KENDALL	74	OSPK		
1.51 ± 0.93	75	CRAWFORD	63	HBC	

$\Gamma(\mu^+\mu^-\gamma)/\Gamma_{\text{total}}$					Γ_{12}/Γ
VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT	
3.1 ± 0.4 OUR FIT					

3.1 ± 0.4 600 DZHELYADIN 80 SPEC $\pi^- p \rightarrow \eta n$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.5 ± 0.75 100 BUSHNIN 78 SPEC See DZHELYADIN 80

$\Gamma(e^+e^-)/\Gamma_{\text{total}}$					Γ_{13}/Γ
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
<5.6 × 10⁻⁶	90	22 AGAKISHIEV 12A	SPEC	$pp \rightarrow \eta + X$	

• • • We do not use the following data for averages, fits, limits, etc. • • •

<2.7 × 10⁻⁵ 90 BERLOWSKI 08 WASA $pd \rightarrow {}^3\text{He } \eta$

<0.77 × 10⁻⁴ 90 BROWDER 97B CLE2 $e^+e^- \simeq 10.5 \text{ GeV}$

<2 × 10⁻⁴ 90 WHITE 96 SPEC $pd \rightarrow \eta {}^3\text{He}$

<3 × 10⁻⁴ 90 DAVIES 74 RVUE Uses ESTEN 67

22 AGAKISHIEV 12A uses a data sample of 3.5 GeV proton beam collisions on liquid hydrogen target collected by the HADES detector.

NODE=S014R40
NODE=S014R40

NODE=S014R51
NODE=S014R51
NEW

NODE=S014R28
NODE=S014R28
NEW

NODE=S014R1
NODE=S014R1
NEW

NODE=S014R1;LINKAGE=N

NODE=S014R2
NODE=S014R2
NEW

NODE=S014R30
NODE=S014R30

NODE=S014R29
NODE=S014R29

NODE=S014R29;LINKAGE=AG

$\Gamma(\mu^+\mu^-)/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-6})	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
5.8±0.8 OUR AVERAGE					
5.7±0.7±0.5		114	ABEGG	94	SPEC $p d \rightarrow \eta^3\text{He}$
6.5±2.1		27	DZHELYADIN	80B	SPEC $\pi^- p \rightarrow \eta n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.6 $^{+0.6}_{-0.7}$ ±0.5		100	KESSLER	93	SPEC See ABEGG 94
< 20		95	WEHMANN	68	OSPK

 Γ_{14}/Γ NODE=S014R23
NODE=S014R23 $\Gamma(\mu^+\mu^-)/\Gamma(2\gamma)$

<u>VALUE</u> (units 10^{-5})	<u>DOCUMENT ID</u>	<u>TECN</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •		
5.9±2.2	HYAMS	69 OSPK

 Γ_{14}/Γ_2 NODE=S014R25
NODE=S014R25 $\Gamma(2e^+2e^-)/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-5})	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2.4±0.2±0.1		362	23 AMBROSINO	11B KLOE	$e^+ e^- \rightarrow \phi \rightarrow \eta\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<9.7		90	BERLOWSKI	08 WASA	$p d \rightarrow {}^3\text{He } \eta$
<6.9		90		AKHMETSHIN 01	$e^+ e^- \rightarrow \phi \rightarrow \eta\gamma$

 Γ_{15}/Γ NODE=S014R41
NODE=S014R4123 This measurement is fully inclusive (includes "2 e^+ 2 e^- γ " channel). $\Gamma(\pi^+\pi^-e^+e^-(\gamma))/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-4})	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2.68±0.11 OUR FIT				
2.68±0.09±0.07	1555 ± 52	24 AMBROSINO	09B KLOE	$e^+ e^- \rightarrow \phi \rightarrow \eta\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.3 $^{+2.0}_{-1.6}$ ±0.4	16	BERLOWSKI	08 WASA	$p d \rightarrow {}^3\text{He } \eta$
4.3 ±1.3 ±0.4	16	BARGHOLTZ	07 CNTR	See BERLOWSKI 08
3.7 $^{+2.5}_{-1.8}$ ±0.3	4	AKHMETSHIN	01 CMD2	$e^+ e^- \rightarrow \phi \rightarrow \eta\gamma$

 Γ_{16}/Γ NODE=S014R10
NODE=S014R10

24 This AMBROSINO 09B value includes radiative events.

 $\Gamma(e^+e^-\mu^+\mu^-)/\Gamma_{\text{total}}$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<1.6 × 10⁻⁴	90	BERLOWSKI	08 WASA	$p d \rightarrow {}^3\text{He } \eta$

 Γ_{17}/Γ NODE=S014R55
NODE=S014R55 $\Gamma(2\mu^+2\mu^-)/\Gamma_{\text{total}}$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<3.6 × 10⁻⁴	90	BERLOWSKI	08 WASA	$p d \rightarrow {}^3\text{He } \eta$

 Γ_{18}/Γ NODE=S014R56
NODE=S014R56 $\Gamma(\mu^+\mu^-\pi^+\pi^-)/\Gamma_{\text{total}}$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<3.6 × 10⁻⁴	90	BERLOWSKI	08 WASA	$p d \rightarrow {}^3\text{He } \eta$

 Γ_{19}/Γ NODE=S014R57
NODE=S014R57 $\Gamma(\pi^+e^-\bar{\nu}_e + \text{c.c.})/\Gamma(\pi^+\pi^-\pi^0)$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<7.3 × 10⁻⁴	90	ABLIKIM	13G BES3	$J/\psi \rightarrow \phi\eta$

 Γ_{20}/Γ_9 NODE=S014R58
NODE=S014R58 $\Gamma(\pi^+\pi^-2\gamma)/\Gamma(\pi^+\pi^-\pi^0)$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
< 9 × 10⁻³		PRICE	67 HBC	

 Γ_{21}/Γ_9 NODE=S014R18
NODE=S014R18

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<16 \times 10^{-3}$	95	BALTAY	67B DBC
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 $\Gamma(\pi^+\pi^-\pi^0\gamma)/\Gamma(\pi^+\pi^-\pi^0)$

<u>VALUE</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
<0.24 × 10⁻²	90	0	THALER	73 ASPK

 Γ_{22}/Γ_9 NODE=S014R17
NODE=S014R17

• • • We do not use the following data for averages, fits, limits, etc. • • •

<1.7 × 10 ⁻²	90	ARNOLD	68 HLBC
<1.6 × 10 ⁻²	95	BALTAY	67B DBC
<7.0 × 10 ⁻²		FLATTE	67 HBC
<0.9 × 10 ⁻²		PRICE	67 HBC

$\Gamma(\pi^0 \mu^+ \mu^- \gamma)/\Gamma_{\text{total}}$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	Γ_{23}/Γ
$< 3 \times 10^{-6}$	90	DZHELYADIN	81	SPEC	$\pi^- p \rightarrow \eta n$

Forbidden modes $\Gamma(\pi^0 \gamma)/\Gamma_{\text{total}}$

Forbidden by angular momentum conservation.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	Γ_{24}/Γ
$< 9 \times 10^{-5}$	90	NEFKENS	05A	CRYB	$p(720 \text{ MeV/c}) \pi^- \rightarrow n\eta$

 $\Gamma(\pi^+ \pi^-)/\Gamma_{\text{total}}$ Forbidden by P and CP invariance.

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_{25}/Γ
$< 0.13 \times 10^{-4}$	90	16M	AMBROSINO	05A	KLOE	$e^+ e^- \rightarrow \phi \rightarrow \eta\gamma$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$						
$< 3.9 \times 10^{-4}$	90	225M	ABLIKIM	11G	BES3	$e^+ e^- \rightarrow J/\psi \rightarrow \eta\gamma$
$< 3.3 \times 10^{-4}$	90		AKHMETSHIN	99B	CMD2	$e^+ e^- \rightarrow \phi \rightarrow \eta\gamma$
$< 9 \times 10^{-4}$	90		AKHMETSHIN	97C	CMD2	See AKHMETSHIN 99B
$< 15 \times 10^{-4}$		0	THALER	73	ASPK	

 $\Gamma(2\pi^0)/\Gamma_{\text{total}}$ Forbidden by P and CP invariance.

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_{26}/Γ
$< 3.5 \times 10^{-4}$	90		BLIK	07	GAM4	$\pi^- p \rightarrow \eta n$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$						
$< 6.9 \times 10^{-4}$	90	225M	ABLIKIM	11G	BES3	$e^+ e^- \rightarrow J/\psi \rightarrow \eta\gamma$
$< 4.3 \times 10^{-4}$	90		AKHMETSHIN	99C	CMD2	$e^+ e^- \rightarrow \phi \rightarrow \eta\gamma$
$< 6 \times 10^{-4}$	90	25	ACHASOV	98	SND	$e^+ e^- \rightarrow \phi \rightarrow \eta\gamma$

25 ACHASOV 98 observes one event in a $\pm 3\sigma$ region around the η mass, while a Monte Carlo calculation gives 10 ± 5 events. The limit here is the Poisson upper limit for one observed event and no background.

 $\Gamma(2\pi^0 \gamma)/\Gamma_{\text{total}}$ Forbidden by C invariance.

VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT	Γ_{27}/Γ
$< 5 \times 10^{-4}$	90	NEFKENS	05	CRYB	0	$p(720 \text{ MeV/c}) \pi^- \rightarrow n\eta$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$						
$< 17 \times 10^{-4}$	90	BLIK	07	GAM4		$\pi^- p \rightarrow \eta n$

 $\Gamma(3\pi^0 \gamma)/\Gamma_{\text{total}}$ Forbidden by C invariance.

VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT	Γ_{28}/Γ
$< 6 \times 10^{-5}$	90	NEFKENS	05	CRYB	0	$p(720 \text{ MeV/c}) \pi^- \rightarrow n\eta$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$						
$< 24 \times 10^{-5}$	90	BLIK	07	GAM4		$\pi^- p \rightarrow \eta n$

 $\Gamma(3\gamma)/\Gamma_{\text{total}}$ Forbidden by C invariance.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	Γ_{29}/Γ
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$					
$< 16 \times 10^{-5}$	90	BLIK	07	GAM4	$\pi^- p \rightarrow \eta n$
$< 4 \times 10^{-5}$	90	NEFKENS	05A	CRYB	$p(720 \text{ MeV/c}) \pi^- \rightarrow n\eta$

 $\Gamma(3\gamma)/\Gamma(2\gamma)$

VALUE	CL%	DOCUMENT ID	TECN	CHG	Γ_{29}/Γ_2
$< 1.2 \times 10^{-3}$	95	ALDE	84	GAM2	0

 $\Gamma(3\gamma)/\Gamma(3\pi^0)$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	Γ_{29}/Γ_3
$< 4.9 \times 10^{-5}$	90	ALOISIO	04	KLOE	$\phi \rightarrow \eta\gamma$

NODE=S014R31
NODE=S014R31

NODE=S014320

NODE=S014R16

NODE=S014R16

NODE=S014R16

NODE=S014R27

NODE=S014R27

NODE=S014R27

NODE=S014R37

NODE=S014R37

NODE=S014R37

NODE=S014R37;LINKAGE=A

NODE=S014R20

NODE=S014R20

NODE=S014R20

NODE=S014R48

NODE=S014R48

NODE=S014R48

NODE=S014R46

NODE=S014R46

NODE=S014R46

NODE=S014R44

NODE=S014R44

NODE=S014R45

NODE=S014R45

$\Gamma(4\pi^0)/\Gamma_{\text{total}}$ Forbidden by P and CP invariance.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$< 6.9 \times 10^{-7}$	90	PRAKHOV	00	CRYB $\pi^- p \rightarrow n\eta$, 720 MeV/c
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$< 200 \times 10^{-7}$	90	BLIK	07	GAM4 $\pi^- p \rightarrow \eta n$

 Γ_{30}/Γ

NODE=S014R39
NODE=S014R39
NODE=S014R39

 $\Gamma(\pi^0 e^+ e^-)/\Gamma_{\text{total}}$ C parity forbids this to occur as a single-photon process.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$			
$< 1.6 \times 10^{-4}$	90	MARTYNOV	76
$< 8.4 \times 10^{-4}$	90	BAZIN	68
$< 70 \times 10^{-4}$		RITTENBERG	65
			HBC

 Γ_{31}/Γ

NODE=S014R15
NODE=S014R15
NODE=S014R15

 $\Gamma(\pi^0 e^+ e^-)/\Gamma(\pi^+ \pi^- \pi^0)$ C parity forbids this to occur as a single-photon process.

<u>VALUE</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
$< 1.9 \times 10^{-4}$	90		JANE	75
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$< 42 \times 10^{-4}$	90		BAGLIN	67
$< 16 \times 10^{-4}$	90	0	BILLING	67
$< 77 \times 10^{-4}$		0	FOSTER	65B
$< 110 \times 10^{-4}$			PRICE	65
				HBC

 Γ_{31}/Γ_9

NODE=S014R9
NODE=S014R9
NODE=S014R9

 $\Gamma(\pi^0 \mu^+ \mu^-)/\Gamma_{\text{total}}$ C parity forbids this to occur as a single-photon process.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$< 5 \times 10^{-6}$	90	DZHELYADIN	81	SPEC $\pi^- p \rightarrow \eta n$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$< 500 \times 10^{-6}$		WEHMANN	68	OSPK

 Γ_{32}/Γ

NODE=S014R24
NODE=S014R24
NODE=S014R24

 $[\Gamma(\mu^+ e^-) + \Gamma(\mu^- e^+)/\Gamma_{\text{total}}$

Forbidden by lepton family number conservation.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$< 6 \times 10^{-6}$	90	WHITE	96	SPEC $p d \rightarrow \eta^0 {}^3\text{He}$

 Γ_{33}/Γ

NODE=S014R36
NODE=S014R36
NODE=S014R36

 η C-NONCONSERVING DECAY PARAMETERS $\pi^+ \pi^- \pi^0$ LEFT-RIGHT ASYMMETRY PARAMETERMeasurements with an error $> 1.0 \times 10^{-2}$ have been omitted.

<u>VALUE</u> (units 10^{-2})	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
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 $0.09^{+0.11}_{-0.12}$ OUR AVERAGE

$+0.09 \pm 0.10^{+0.09}_{-0.14}$	1.34M	AMBROSINO	08D	KLOE
0.28 \pm 0.26	165k	JANE	74	OSPK
-0.05 \pm 0.22	220k	LAYER	72	ASPK

 $\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$

1.5 \pm 0.5	37k	${}^{26}\text{GORMLEY}$	68C	ASPK
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26 The GORMLEY 68C asymmetry is probably due to unmeasured ($\mathbf{E} \times \mathbf{B}$) spark chamber effects. New experiments with ($\mathbf{E} \times \mathbf{B}$) controls don't observe an asymmetry.

NODE=S014230

NODE=S014A1
NODE=S014A1
NODE=S014A1

 $\pi^+ \pi^- \pi^0$ SEXTANT ASYMMETRY PARAMETERMeasurements with an error $> 2.0 \times 10^{-2}$ have been omitted.

<u>VALUE</u> (units 10^{-2})	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
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 $0.12^{+0.10}_{-0.11}$ OUR AVERAGE

$+0.08 \pm 0.10^{+0.08}_{-0.13}$	1.34M	AMBROSINO	08D	KLOE
0.20 \pm 0.25	165k	JANE	74	OSPK
0.10 \pm 0.22	220k	LAYER	72	ASPK
0.5 \pm 0.5	37k	GORMLEY	68C	WIRE

NODE=S014AS
NODE=S014AS
NODE=S014AS

NODE=S014A1;LINKAGE=G

$\pi^+\pi^-\pi^0$ QUADRANT ASYMMETRY PARAMETER

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN
-0.09±0.09 OUR AVERAGE			
-0.05±0.10 ^{+0.03} _{-0.05}	1.34M	AMBROSINO	08D KLOE
-0.30±0.25	165k	JANE	74 OSPK
-0.07±0.22	220k	LAYER	72 ASPK

NODE=S014AQ
NODE=S014AQ

$\pi^+\pi^-\gamma$ LEFT-RIGHT ASYMMETRY PARAMETER

Measurements with an error $> 2.0 \times 10^{-2}$ have been omitted.

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN
0.9 ±0.4 OUR AVERAGE			
1.2 ±0.6	35k	JANE	74B OSPK
0.5 ±0.6	36k	THALER	72 ASPK
1.22±1.56	7257	GORMLEY	70 ASPK

NODE=S014A2
NODE=S014A2
NODE=S014A2

$\pi^+\pi^-\gamma$ PARAMETER β (D-wave)

Sensitive to a D-wave contribution: $dN/d\cos\theta = \sin^2\theta (1 + \beta \cos^2\theta)$.

VALUE	EVTS	DOCUMENT ID	TECN
-0.02 ±0.07 OUR AVERAGE			
0.11 ±0.11	35k	JANE	74B OSPK
-0.060±0.065	7250	GORMLEY	70 WIRE
0.12 ±0.06	27	THALER	72 ASPK

NODE=S014BET
NODE=S014BET
NODE=S014BET

• • • We do not use the following data for averages, fits, limits, etc. • • •

²⁷ The authors don't believe this indicates D-wave because the dependence of β on the γ energy is inconsistent with the theoretical prediction. A $\cos^2\theta$ dependence can also come from P- and F-wave interference.

NODE=S014BET;LINKAGE=L

η CP-NONCONSERVING DECAY PARAMETER

$\pi^+\pi^-e^+e^-$ DECAY-PLANE ASYMMETRY PARAMETER A_ϕ

In the η rest frame, the total momentum of the e^+e^- pair is equal and opposite to that of the $\pi^+\pi^-$ pair. Let \hat{z} be the unit vector along the momentum of the e^+e^- pair; let \hat{n}_{ee} and $\hat{n}_{\pi\pi}$ be the unit vectors normal to the e^+e^- and $\pi^+\pi^-$ planes; and let ϕ be the angle between the two normals. Then

$$\sin\phi \cos\phi = [(\hat{n}_{ee} \times \hat{n}_{\pi\pi}) \cdot \hat{z}] (\hat{n}_{ee} \cdot \hat{n}_{\pi\pi}),$$

and

$$A_\phi \equiv \frac{N_{\sin\phi \cos\phi > 0} - N_{\sin\phi \cos\phi < 0}}{N_{\sin\phi \cos\phi > 0} + N_{\sin\phi \cos\phi < 0}}.$$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
-0.6±2.5±1.8	1555 ± 52	AMBROSINO	09B KLOE	$e^+e^- \rightarrow \phi \rightarrow \eta\gamma$

NODE=S014240

NODE=S014AET
NODE=S014AET

NODE=S014AET

NODE=S014235

NODE=S014DP
NODE=S014DP

NODE=S014DP

ENERGY DEPENDENCE OF $\eta \rightarrow 3\pi$ DALITZ PLOTS

PARAMETERS FOR $\eta \rightarrow \pi^+\pi^-\pi^0$

See the "Note on η Decay Parameters" in our 1994 edition, Phys. Rev. **D50**, 1 August 1994, Part I, p. 1454. The following experiments fit to one or more of the coefficients a , b , c , d , or e for $|\text{matrix element}|^2 = 1 + ay + by^2 + cx + dx^2 + exy$.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.34M	AMBROSINO	08D	KLOE	
3230	²⁸ ABELE	98D	CBAR	$\bar{p}p \rightarrow \pi^0\pi^0\eta$ at rest
1077	²⁹ AMSLER	95	CBAR	$\bar{p}p \rightarrow \pi^+\pi^-\eta$ at rest
81k	LAYER	73	ASPK	
220k	LAYER	72	ASPK	
1138	CARPENTER	70	HBC	
349	DANBURG	70	DBC	
7250	GORMLEY	70	WIRE	
526	BAGLIN	69	HLBC	
7170	CNOPS	68	OSPK	
37k	GORMLEY	68C	WIRE	
1300	CLPWY	66	HBC	
705	LARRIBE	66	HBC	

²⁸ ABELE 98D obtains $a = -1.22 \pm 0.07$ and $b = 0.22 \pm 0.11$ when c (our d) is fixed at 0.06.

NODE=S014DP;LINKAGE=B

²⁹ AMSLER 95 fits to $(1+ay+by^2)$ and obtains $a=-0.94 \pm 0.15$ and $b=0.11 \pm 0.27$.

NODE=S014DP;LINKAGE=A

α PARAMETER FOR $\eta \rightarrow 3\pi^0$

See the "Note on η Decay Parameters" in our 1994 edition, Phys. Rev. D50, 1 August 1994, Part I, p. 1454. The value here is of α in $|\text{matrix element}|^2 = 1 + 2\alpha z$.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
-0.0315±0.0015 OUR AVERAGE				
-0.0301±0.0035	+0.0022 -0.0035	512k	AMBROSINO 10A	KLOE $e^+ e^- \rightarrow \phi \rightarrow \eta\gamma$
-0.027 ± 0.008 ± 0.005	120k	³⁰ ADOLPH 09	WASA $pp \rightarrow pp\eta$	
-0.0322±0.0012±0.0022	3M	³¹ PRAKHOV 09	CRYB $\gamma p \rightarrow p\eta$	
-0.032 ± 0.002 ± 0.002	1.8M	³¹ UNVERZAGT 09	CRYB $\gamma p \rightarrow p\eta$	
-0.026 ± 0.010 ± 0.010	75k	BASHKANOV 07	WASA $pp \rightarrow pp\eta$	
-0.010 ± 0.021 ± 0.010	12k	ACHASOV 01C	SND $e^+ e^- \rightarrow \phi \rightarrow \eta\gamma$	
-0.031 ± 0.004	1M	TIPPENS 01	CRYB $\pi^- p \rightarrow n\eta$, 720 MeV	
-0.052 ± 0.017 ± 0.010	98k	ABELE 98C	CBAR $\bar{p}p \rightarrow 5\pi^0$	
-0.022 ± 0.023	50k	ALDE 84	GAM2	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
-0.038 ± 0.003	+0.012 -0.008	1.34M	³² AMBROSINO 08D	KLOE
-0.32 ± 0.37	192	BAGLIN 70	HLBC	

30 This ADOLPH 09 result is independent of the BASHKANOV 07 result.

31 The PRAKHOV 09 and UNVERZAGT 09 results are independent.

32 This AMBROSINO 08D value is an indirect result using $\eta \rightarrow \pi^+\pi^0\pi^-$ events and a rescattering matrix that mixes isospin decay amplitudes.

NODE=S014A0

NODE=S014A0

NODE=S014A0

NODE=S014A0;LINKAGE=AD

NODE=S014A0;LINKAGE=PU

NODE=S014A0;LINKAGE=AM

η REFERENCES

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ABLIKIM 13G	PR D87 032006	M. Ablikim <i>et al.</i>	(BES III Collab.)
BABUSCI 13	PL B718 910	D. Babusci <i>et al.</i>	(KLOE/KLOE-2 Collab.)
BABUSCI 13A	JHEP 1301 119	D. Babusci <i>et al.</i>	(KLOE-2 Collab.)
AGAKISHIEV 12A	EPJ A48 64	G. Agakishiev <i>et al.</i>	(HADES Collab.)
GOSLAWSKI 12	PR D85 112011	P. Goslaski <i>et al.</i>	(COSY-ANKE Collab.)
ABLIKIM 11G	PR D84 032006	M. Ablikim <i>et al.</i>	(BES III Collab.)
AMBROSINO 11B	PL B702 324	F. Ambrosino <i>et al.</i>	(KLOE Collab.)
BERGHAUSER 11	PL B701 562	H. Berghauser <i>et al.</i>	(GIES, UCLA, GUTE)
AMBROSINO 10A	PL B694 16	F. Ambrosino <i>et al.</i>	(KLOE Collab.)
ADOLPH 09	PL B677 24	C. Adolph <i>et al.</i>	(WASA at COSY Collab.)
AMBROSINO 09B	PL B675 283	F. Ambrosino <i>et al.</i>	(KLOE Collab.)
PRAKHOV 09	PR C79 035204	S. Prakhov <i>et al.</i>	(MAMI-C Crystal Ball Collab.)
UNVERZAGT 09	EPJ A39 169	M. Unverzagt <i>et al.</i>	(MAMI-B Crystal Ball Collab.)
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BARGHOLTZ 07	PL B644 299	Chr. Bargholtz <i>et al.</i>	(CELSIUS/WASA Collab.)
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LOPEZ 07	PRL 99 122001	A. Lopez <i>et al.</i>	(CLEO Collab.)
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ABDEL-BARY 05	PL B619 281	M. Abdel-Bary <i>et al.</i>	(GEM Collab.)
AKHMETSHIN 05	PL B605 26	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
AMBROSINO 05A	PL B606 276	F. Ambrosino <i>et al.</i>	(KLOE Collab.)
NEFKENS 05	PRL 94 041601	B.M.K. Nefkens <i>et al.</i>	(BNL Crystal Ball Collab.)
NEFKENS 05A	PR C72 035212	B.M.K. Nefkens <i>et al.</i>	(BNL Crystal Ball Collab.)
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ALOISIO 04	PL B591 49	A. Aloisio <i>et al.</i>	(KLOE Collab.)
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NEFKENS 02	PS T99 114	B.M.K. Nefkens, J.W. Price	(Novosibirsk SND Collab.)
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ACHASOV 01C	JETP 73 451	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
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ACHASOV 01D	NP B600 3	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
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BARU	90	ZPHY C48 581	S.E. Baru <i>et al.</i>	(MD-1 Collab.)	REFID=41366		
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WILLIAMS	88	PR D38 1365	D.A. Williams <i>et al.</i>	(Crystal Ball Collab.)	REFID=40567		
AIHARA	86	PR D33 844	H. Aihara <i>et al.</i>	(TPC-2γ Collab.)	REFID=10845		
BARTEL	85E	PL 160B 421	W. Bartel <i>et al.</i>	(JADE Collab.)	REFID=10843		
LANDSBERG	85	PRPL 128 301	L.G. Landsberg	(SERP)	REFID=10844		
ALDE	84	ZPHY C25 225	D.M. Alde <i>et al.</i>	(SERP, BELG, LAPP)	REFID=10841		
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WEINSTEIN	83	Translated from YAF 40 1447.	A.J. Weinstein <i>et al.</i>	(Crystal Ball Collab.)	REFID=10840		
BINON	82	PR D28 2896	F.G. Binon <i>et al.</i>	(SERP, BELG, LAPP+)	REFID=10838		
Also		SJNP 36 391	Translated from YAF 36 670.				
DAVYDOV	81	NC 71A 497	F.G. Binon <i>et al.</i>	(SERP, BELG, LAPP+)	REFID=10839		
Also		LNC 32 45	V.A. Davyдов <i>et al.</i>	(SERP, BELG, LAPP+)	REFID=10834		
ABROSIMOV	80	SJNP 33 825	V.A. Davyдов <i>et al.</i>	(SERP, BELG, LAPP+)	REFID=10835		
DZHELYADIN	81	Translated from YAF 33 1534.	R.I. Dzhelyadin <i>et al.</i>	(SERP)	REFID=10836		
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DZHELYADIN	80B	Translated from YAF 32 998.	PL 97B 471	(R.I. Dzhelyadin <i>et al.</i>)	(SERP)	REFID=10833	
Also		SJNP 32 518	R.I. Dzhelyadin <i>et al.</i>	(SERP)	REFID=10832		
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JANE	75	Translated from YAF 23 93.	PL 59B 103	M.R. Jane <i>et al.</i>	(RHEL, LOWC)	REFID=10823	
JANE	75B	PL 59B 103	PL 73B 503	M.R. Jane <i>et al.</i>	(RHEL, LOWC)	REFID=10824	
Also		Erratum in private communication.		M.R. Jane		REFID=10825	
BROWMAN	74B	PRL 32 1067	A. Browman <i>et al.</i>	(CORN, BING)	REFID=10818		
DAVIES	74	NC 24A 324	J.D. Davies, J.G. Guy, R.K.P. Zia	(BIRM, RHEL+)	REFID=10728		
DUANE	74	PRL 32 425	A. Duane <i>et al.</i>	(LOIC, SHMP)	REFID=20284		
JANE	74	PL 48B 260	M.R. Jane <i>et al.</i>	(RHEL, LOWC, SUSS)	REFID=10820		
JANE	74B	PL 48B 265	M.R. Jane <i>et al.</i>	(RHEL, LOWC, SUSS)	REFID=10821		
KENDALL	74	NC 21A 387	B.N. Kendall <i>et al.</i>	(BROW, BARI, MIT)	REFID=10822		
LAYER	73	PR D7 2565	J.G. Layter <i>et al.</i>	(COLU)	REFID=10816		
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AGUILAR...	72B	PR D6 29	M. Aguilar-Benitez <i>et al.</i>	(BNL)	REFID=20205		
BLOODWO...	72B	NP B39 525	I.J. Bloodworth <i>et al.</i>	(TNTO)	REFID=10813		
LAYER	72	PRL 29 316	J.G. Layter <i>et al.</i>	(COLU)	REFID=10814		
THALER	72	PRL 29 313	J.J. Thaler <i>et al.</i>	(COLU)	REFID=10815		
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STRUGALSKI	71	NP B27 429	Z.S. Strugalski <i>et al.</i>	(JINR)	REFID=10811		
BAGLIN	70	NP B22 66	C. Baglin <i>et al.</i>	(EPOL, MADR, STRB)	REFID=10796		
BUTTRAM	70	PRL 25 1358	M.T. Buttram, M.N. Kreisler, R.E. Mischke	(PRIN)	REFID=10801		
CARPENTER	70	PR D1 1303	D.W. Carpenter <i>et al.</i>	(DUKE)	REFID=10802		
COX	70B	PRL 24 534	B. Cox, L. Fortney, J.P. Golson	(DUKE)	REFID=10803		
DANBURG	70	PR D2 2564	J.S. Danburg <i>et al.</i>	(LRL)	REFID=10804		
DEVONS	70	PR D1 1936	S. Devons <i>et al.</i>	(COLU, SYRA)	REFID=10805		
GORMLEY	70	PR D2 501	M. Gormley <i>et al.</i>	(COLU, BNL)	REFID=10806		
Also		Thesis Nevis 181	M. Gormley	(COLU)	REFID=10807		
BAGLIN	69	PL 29B 445	C. Baglin <i>et al.</i>	(EPOL, UCB, MADR, STRB)	REFID=10795		
Also		NP B22 66	C. Baglin <i>et al.</i>	(EPOL, MADR, STRB)	REFID=10796		
HYAMS	69	PL 29B 128	B.D. Hyams <i>et al.</i>	(CERN, MPIM)	REFID=10797		
ARNOLD	68	PL 27B 466	R.G. Arnold <i>et al.</i>	(STRB, MADR, EPOL+)	REFID=10790		
BAZIN	68	PL 20 895	M.J. Bazin <i>et al.</i>	(PRIN, QUKIN)	REFID=10791		
BULLOCK	68	PL 27B 402	F.W. Bullock <i>et al.</i>	(LOUC)	REFID=10792		
CNOPS	68	PRL 21 1609	A.M. Cnops <i>et al.</i>	(BNL, ORNL, UCND+)	REFID=20789		
GORMLEY	68C	PRL 21 402	M. Gormley <i>et al.</i>	(COLU, BNL)	REFID=10793		
WEHMANN	68	PR D0 748	A.W. Wehmann <i>et al.</i>	(HARV, CASE, SLAC+)	REFID=10794		
BAGLIN	67	PL 24B 637	C. Baglin <i>et al.</i>	(EPOL, UCB)	REFID=10774		
BAGLIN	67B	BAPS 12 567	C. Baglin <i>et al.</i>	(EPOL, UCB)	REFID=10775		
BALTAY	67B	PRL 19 1498	C. Baltay <i>et al.</i>	(COLU, STON)	REFID=10777		
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BEMPORAD	67	PL 25B 380	C. Bemporad <i>et al.</i>	(PISA, BONN)	REFID=10778		
Also		Private Comm.	I. Ion		REFID=10779		
BILLING	67	PL 25B 435	K.D. Billing <i>et al.</i>	(LOUC, OXF)	REFID=10780		
BUNIATOV	67	PL 25B 560	S.A. Bunyatov <i>et al.</i>	(CERN, KARL)	REFID=10782		
CENCE	67	PRL 19 1393	R.J. Cence <i>et al.</i>	(HAWA, LRL)	REFID=10783		
ESTEN	67	PL 24B 115	M.J. Esten <i>et al.</i>	(LOUC, OXF)	REFID=10784		
FELDMAN	67	PRL 18 868	M. Feldman <i>et al.</i>	(PENN)	REFID=10785		
FLATTE	67	PRL 18 976	S.M. Flatte	(LRL)	REFID=10786		
FLATTE	67B	PR 163 1441	S.M. Flatte, C.G. Wohl	(LRL)	REFID=10787		
LITCHFIELD	67	PL 24B 486	P.J. Litchfield <i>et al.</i>	(RHEL, SACL)	REFID=10788		
PRICE	67	PRL 18 1207	L.R. Price, F.S. Crawford	(LRL)	REFID=10789		
ALFF...	66	PR 145 1072	C. Alff-Steinberger <i>et al.</i>	(COLU, RUTG)	REFID=10762		
CLPWY	66	PR 149 1044	C. Baltay	(SCUC, LRL, PURD, WISC, YALE)	REFID=10764		
CRAWFORD	66	PRL 16 333	F.S. Crawford, L.R. Price	(LRL)	REFID=10766		
DIGIUGNO	66	PRL 16 767	G. di Giugno <i>et al.</i>	(NAPL, TRST, FRAS)	REFID=10767		
GRUNHAUS	66	Thesis	J. Grunhaus	(COLU)	REFID=10769		
JAMES	66	PR 142 896	F.E. James, H.L. Kraybill	(YALE, BNL)	REFID=10770		
JONES	66	PL 23 597	W.G. Jones <i>et al.</i>	(LOIC, RHEL)	REFID=10771		
LARRIBE	66	PL 23 600	A. Larribe <i>et al.</i>	(SACL, RHEL)	REFID=10772		
FOSTER	65	PR 138 B652	M. Foster <i>et al.</i>	(WISC, PURD)	REFID=10757		
FOSTER	65B	Athens Conf.	M. Foster, M. Good, M. Meer	(WISC)	REFID=10758		
FOSTER	65C	Thesis	M. Foster	(WISC)	REFID=10759		
PRICE	65	PR 15 123	L.R. Price, F.S. Crawford	(LRL)	REFID=10760		
RITTENBERG	65	PRL 15 556	A. Rittenberg, G.R. Kalbfleisch	(LRL, BNL)	REFID=10761		
FOELSCH	64	PR 134 B1138	H.W.J. Foelsche, H.L. Kraybill	(YALE)	REFID=10754		
KRAEMER	64	PR 136 B496	R.W. Kraemer <i>et al.</i>	(JHU, NWES, WOOD)	REFID=10755		
PAULI	64	PL 13 351	E. Pauli, A. Muller	(SACL)	REFID=10756		
BACCI	63	PRL 11 37	C. Bacci <i>et al.</i>	(ROMA, FRAS)	REFID=10750		
CRAWFORD	63	PRL 10 546	F.S.Jr. Crawford, L.J. Lloyd, E.C. Fowler	(LRL+)	REFID=10751		
Also		PRL 16 907	F.S. Crawford, L.J. Lloyd, E.C. Fowler	(LRL+)	REFID=10752		
ALFF...	62	PRL 9 322	C. Alff-Steinberger <i>et al.</i>	(COLU, RUTG)	REFID=10746		
BASTIEN	62	PRL 8 114	P.L. Bastien <i>et al.</i>	(LRL)	REFID=10747		
PICKUP	62	PRL 8 329	E. Pickup, D.K. Robinson, E.O. Salant	(CNRC+)	REFID=10749		